in certain particulars. "I found a university," he said, "housed in the half of a building which, though splendid, is entirely inadequate and bears another name, without any proper accommodation for its examinations, without even sufficient room for its normal business or for the meetings of its Senate, councils, and committees; a university which sorely needs endowments and buildings for advanced teaching and research; which has no place that can become a centre for the intellectual and social life of the teachers and students belonging to its numerous schools; a university mainly dependent upon examination fees for its existence, while compelled to consume one-half of these fees in the expenses of the examinations themselves." The presentees included 13 Doctors of Science and 261 Bachelors of Science. It is remarkable that the number of B.Sc.'s presented slightly exceeds the number of B.A.'s (254). In addition, 86 B.Sc.'s in engineering were presented.

The new physiology institute at University College, funds for the building of which were provided by the generosity of Mr. Ludwig Mond and Dr. Aders Plimmer and by the bequest of the late Mr. T. Webb, will be opened on June 18 by Mr. Haldane, Secretary of State for War.

THE King has signed the warrant for granting a charter establishing the University of Bristol.

LORD REAY will open the new buildings of the Merchant Venturers' Technical College, Bristol, on June 24.

MR. R. A. CHISOLM has been appointed Greville research student for research in connection with the subject of cancer at Guy's Hospital Medical School.

THE old Galway students of Prof. Senier have just presented him with an address encased in a silver casket, expressing their pleasure at the recent action of the Royal University in conferring upon him the honorary degree of Doctor of Science in recognition of his services to science and to university education in Ireland.

WE learn from *Science* that subscriptions to the C. W. Eliot fund have been received from about 2050 graduates of Harvard University and others, and amount at this time to about 26,000*l*. The committee hoped that the fund would amount to more than 30,000*l*. by May 19, when President Eliot retired. The subscriptions have been placed in the hands of trustees, to invest and hold for the benefit of President and Mrs. Eliot. The fund will eventually pass to Harvard University.

THE Goldsmiths' Company recently offered a gift of 50,000*l*. to the governors of the Imperial College of Science and Technology towards the cost of the proposed extension of the engineering department of the college, and on May 14 the offer was gratefully accepted by the governors. Writing to Lord Crewe, as chairman of the governors, Sir Walter Prideaux, on behalf of the Goldsmiths' Company, pointed out that the gift was irrespective of the company's support to the City and Guilds Institute, and that their subscriptions in the latter direction would not be curtailed. The letter reminded Lord Crewe that the whole of the engineering department of the Imperial College is to be called "The City and Guilds College." The Goldsmiths' Company has expressed the hope that the company will be given separate representation on the delegacy which it is proposed shall administer the entire department of engineering, and the governors of the college have promised that the wishes of the company shall receive immediate attention. The Goldsmiths' Company will pay 10,000*l*. on the day whereon the contract for the work is signed, and the remainder by instalments spread over a period of not fewer than three years.

IN his annual address as president of the Royal Institution of Cornwall, Dr. R. Pearce discussed the attempts made by the society to provide instruction for miners in the subjects connected with their occupation. One of the objects of the institution, founded in 1818, was to establish a mining school, the first of the kind in England. The results were at first unsatisfactory; but in 1859 the school was re-organised with the advice and assistance of Mr. R. Hunt, and at a later date by Sir C. Le Neve Foster. The result has been, not so much to improve the methods of Cornish mining, as to provide students qualified for work in other places. Out of 221 students at the Camborne School only forty-one are Cornishmen, the balance being made up from natives of other parts of the country and several foreigners. The school has supplied mining engineers for the colonies and foreign countries, and the president, summing up the results, remarks:—"We may, I think, congratulate ourselves on the fact that, although Cornwall is not deriving any very important benefit by the application of scientific instruction to its mining industry, our colonies and our colonial mining and metallurgical enterprises are being built up from material furnished from our Cornish mining schools."

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 13.—Sir Archibald Geikie, K.C.B., president, in the chair.—Recent solar research; Dr. G. E. **Hale**.—Utilisation of energy stored in springs: A. **Mallock**, F.R.S. The "dynamic worth" of a substance is the work which can be elastically stored in it, divided by its mass. It may be expressed either as the square of the velocity which the stored work could impart to the mass, or, in gravity measure, as the height to which the stored work could raise the weight of the mass. The dynamic worth of india-rubber is more than ten times as great as for any other known substance, and for this reason india-rubber may be used with advantage in certain cases as a source of motive power. It is pointed out in the paper that if the potential energy in the strained material is to be efficiently converted into mechanical work, no frictional contact must occur while the strained material is returning to its original shape. Thus, if the strained material is in the form of a long cord wound on a reel (as the most convenient method of storage), the condition as to the absence of friction during contraction makes it necessary to develop the stored energy in cycles. In the first place, keeping the tension of the cord constant, a certain length must be unwound from the reel and the reel clamped. The cord also must be clamped in two places, first, near the place where it leaves the reel, and again at the extremity of the strained part, to some moving piece of the mechanism. If the part of the cord included between these points is then allowed to contract, the whole elastic work it contained is transferred to the machine. The above cycle may be repeated as long as any stretched cord remains on the reel. Any change of tension, however, in the process of unwinding involves loss of efficiency, due to the sliding of the cord on the reel or on the underlying coils, which must occur if the tension in the wound and unwound parts differs.—A new kind of glow in vacuum tubes: Rev. H. V. **Gill**. The experiments described in the paper were made with the object of investigating the nature and causes of a phenomenon observed by the writer when occupied with a research connected with palladium foil. A piece of palladium foil, or platinum foil coated with palladium black, is heated to a white heat in air at a pressure of about 0·15 mm. A purple-blue glow is seen to surround the hot metal. Between the glow and the palladium there is a dark space. The thickness of the dark space varies with the temperature of the foil. The glow disappears when the tube is heated to a high temperature, and returns when it is cooled. It is shown that the presence of the glow depends on a reaction between the gases introduced into the tube when the palladium is heated and the disintegrated particles of palladium. Water vapour is required to be present in the tube, and the glow can be made to disappear by freezing out the vapour by means of a few drops of liquid air applied to the outside of the tube, or by introducing some phosphorous pentoxide into the tube. The spectrum of the glow shows certain regions which correspond to portions of the spectrum of carbon monoxide gas. It is also shown that carbon monoxide is present in the tube which shows the glow. No effect was observed when electric and magnetic fields were applied to the glow. The probable cause of the luminosity is the luminous union

of carbon monoxide and oxygen brought about by palladium charged with hydrogen in the presence of water vapour. A second effect is also briefly described, which appears to be due to the causes which give rise to thermo-luminosity.—The elastic limits of iron and steel under cyclical variations of stress: L. **Bairstow.** An explanation of the fatigue of materials due to the repetition of stresses of sufficiently great magnitude has been investigated experimentally, and found to agree completely with experiments to destruction. The theory was proposed by Bauschinger in 1886, and states that fatigue occurs when the cycle of stress is so great that the extensions produced thereby are not wholly within the limits of elasticity of the material. For this to be true for the whole of Wöhler's well-known experiments, the inferior and superior elastic limits must be variable, but it must not be possible to vary one limit independently of the other. The experiments dealing with this question have been made in a specially constructed testing machine, the repetitions being produced so slowly that the extensions of the specimen at the extreme loads in the cycle could be observed under the normal conditions of test. This new feature in experiments on fatigue has led to the discovery that iron and steel can be made to yield by the repeated application of a cycle of stress in which the maximum stress is considerably less than the static yield stress. Such yielding accompanies any change in the position of the elastic limits, the change being greater as the amount of the yielding is greater. The position of the elastic limits has been found for a number of ratios of maximum to minimum stress, and the relationship of the results to Wöhler's experiments shown. The well-known Gerber parabola is shown to be only a rough approximation.—Functions of positive and negative type: J. **Mercer.**

Geological Society, April 28.—Prof. W. J. Sollas, F.R.S., president, and afterwards Prof. W. W. Watts, F.R.S., vice-president, in the chair.—The boulders of the Cambridge drift: R. H. **Rastall** and J. **Romanes.** For several years past a large number of boulders have been collected from the Glacial drifts of Cambridgeshire, and from the post-Glacial gravels which have been derived from the drifts. These specimens have been classified geographically, and then subjected to a careful petrological examination, with a view to the determination of their origin. Rocks of Scandinavian origin, and especially those of the Christiania province, are abundant throughout the whole area. Rocks from the Cheviots and central Scotland are more abundant than was formerly believed, and specimens have also been identified from the Old Red Sandstone conglomerates of Forfarshire and from Buchan Ness (Aberdeenshire). Lake District rocks probably also occur in small quantity. Much of the Chalk and flints appear to be of northern origin. It is concluded that an older Boulder-clay, containing foreign erratics, the equivalent of the Cromer Till, once extended over the whole district, but was subsequently incorporated with the Great Chalky Boulder-clay. The Scandinavian ice advanced from the direction of the Wash, bringing with it Red Chalk and bored Gryphæas from the bed of the North Sea, and carrying them as far west as Bedford. Rocks from the north of the British Isles become progressively scarcer from west to east, and the distinctive types are absent to the east of Cambridge. They appear to have been brought by an ice-stream coming from a northerly direction, which probably to a certain extent replaced the Scandinavian ice towards the east.—The nephrite and magnesian rocks of the South Island of New Zealand: A. M. **Finlayson.** The magnesian rocks described in this paper are a disconnected series of intrusive peridotites, forming a more or less defined belt along the western portion of the South Island, parallel to the trend of the island and to the structural and geographic axes of the main Alpine range. The course taken by these rocks apparently follows one of the main Pacific trend-lines, the nature of which will be more fully understood with the further elucidation of the structural geology of the region. The rocks are intrusive into sedimentary strata of ages varying from Ordovician to Jura-Trias, and, so far as can yet be determined, all the exposures appear to be of approximately contemporaneous origin.

Royal Anthropological Institute, May 4.—Mr. J. Gray, treasurer, in the chair.—Some stone circles in Ireland: A. L. **Lewis.** The author described several large circles in the neighbourhood of Lough Gur, co. Limerick. These differ from the British circles, being thick banks of earth faced on each side by large stones, but they are furnished with outlying single stones in a manner similar to that found at many of the circles in England and Scotland; these outlying stones are apparently in the direction of the rising of some star at a very early date. One of the largest circles was "restored" shortly after 1860, and now consists of a wall, 150 feet in diameter and 5 feet high, of stones, backed outside by a bank of earth 30 feet wide, through which there is but one entrance, a passage 3 feet wide, lined with stones on each side; this entrance is in the direction of the rising sun in May. The author suggested that, assuming the restoration of this circle to be correct, it differed in construction from the others, and possibly also in its purpose, and that it might have been used as a pound for wild animals driven into it from outside over the sloping bank, and kept inside to be killed as required. There were also circles of stones without earthen banks, remains of cromlechs or dolmens, locally called "giants' graves," and many other interesting ruins belonging to various ages, and there was also the usual melancholy tale of monuments of all sorts destroyed. In another short note Mr. Lewis directed attention to some concentric circular markings, similar to those found at New Grange and other prehistoric places, faintly incised on a stone on the Rock of Cashel, on which the early kings of Munster were said to have been crowned, and which now serves as a pedestal for a very ancient cross.

Linnean Society, May 6.—Dr. D. H. Scott, F.R.S., president, in the chair.—Some Zoantheæ from Queensland and the New Hebrides: Mrs. L. J. **Wilsmore.**—Two new genera of Thysanoptera from Venezuela: R. S. **Bagnall.**

Mathematical Society, May 13.—Sir W. D. Niven, president, in the chair.—Ternary quadratic types: H. W. **Turnbull.**—Gauss's theorem, and on the semi-convergence of certain force integrals in the theory of attractions: Dr. J. G. **Leathem.**—The continuity or discontinuity of a function defined by an infinite product: J. E. **Littlewood.**

MANCHESTER.

Literary and Philosophical Society, April 20.—Prof. H. B. Dixon, F.R.S., president, and later Mr. F. Jones, in the chair.—The Guatemalan earthquakes and eruption of 1902: W. S. **Ascoli.** The earthquake occurred on April 18, 1902, at about 8.25 p.m., the intensity being greatest in western Guatemala, where the second and richest city of the country, Quezaltenango, was completely destroyed. Many other places suffered greatly, and about 1400 of the 20,000 people living in the disturbed region lost their lives. Six months later, on October 24, 1902, there followed the eruption of the neighbouring volcano, Santa Maria, the ash of which covered an area of more than 125,000 square miles. The region, over which nearly 8 inches of ashes and pumice-stone fell, extended to about 2000 square miles, and within it most of the houses and farm buildings fell in under the weight of the ejectamenta, and in some places were totally destroyed. It is estimated that 6000 persons were killed. The cloud from the volcano was eighteen miles in height, and the detonation was audible at Costa Rica, 500 miles away. The whole of the side of the mountain was blown out, exposing a perpendicular cliff 7000 feet high, and forming a crater seven-eighths of a mile long, three-quarters of a mile wide, and 1500 feet deep.—Apical pigment-spots in the pluteus of *Echinus miliaris*: F. H. **Gravely.** In advanced living plutei of *Echinus miliaris* from the plankton of Port Erin Bay there are present in close association with the apical plate two pairs of pigment-spots, and one pair of tufts of stiff cilia. The anterior pair of pigment-spots is small, and of a transparent red colour. The posterior pair are smaller, and of an opaque yellow. They are situated in the general cavity, closely applied to the inner surface of the apical plate, and are probably composed of the same substance as that of similar cells described by MacBride as being found in other parts of the body—especially in large masses beneath

the four epaulettes—of the pluteus of *Echinus esculentus*. This substance occurs, with a similar distribution, in the pluteus of *E. miliaris*.

CAPE TOWN.

Royal Society of South Africa, March 17.—Dr. Wm. Flint in the chair.—The spectrum of the ruby: J. **Moir.** On placing a ruby before the slit of a spectroscope, using strong illumination, preferably sunlight, a very remarkable absorption spectrum is obtained, which differs from all others in resembling an ordinary *emission* spectrum. The light is cut off except for a sharp narrow red band situated just beyond the B line of the solar spectrum, and this band bears the closest resemblance to the potassium or lithium line as commonly seen in the Bunsen flame when a rather wide slit is used. The limiting wave-lengths of the band are about 6915 and 6945 tenthmetres. Its width is therefore about half its distance from the B line in the solar spectrum. The phenomenon is most easily seen in pale rubies; corundum with even the faintest pink shade generally shows the characteristic line; but even the darkest true rubies show it if the illumination be strong enough. No other pink or red stone—pyrope, almandine, spinel, or tourmaline, for example—shows this line, which would therefore appear to be characteristic of the colouring of the true ruby. In addition to the red line the spectrum contains wide green and orange bands, which are, however, not characteristic.—Remarks on some experiments with the venom of South African snakes: W. **Frei.** The author contends that, from a toxicological point of view, the classification of the snakes in (1) Oglypha, (2) Opistoglypha, (3) Proteroglypha, (4) Solenoglypha, is the most satisfactory.—An upper limit for the value of a determinant. Note on a theorem regarding a sum of differential coefficients of principal minors of a Jacobian: Dr. T. **Muir.**—Note on a Cœnurus of the Duiker bok: L. H. **Gough.** The parasite was found imbedded in the muscles between the scapula and the vertebral column of a Duiker Bok (*Cephalophus Grimmi*).—The evolution of the river system of Griqualand West: A. L. **Du Toit.** The drainage system in the area dealt with consists of the Orange River with its tributaries, the Vaal, Harts, Riet, and Brak rivers, sections of the first three forming the continuous valley facing the edge of the Kaap Plateau from Vryburg almost to Prieska.

DIARY OF SOCIETIES.

THURSDAY, MAY 20.

ROYAL SOCIETY, at 4.30.—Observations on the Urine in Chronic Disease of the Pancreas: Dr. P. J. Cammidge.—*Trypanosoma ingens*, n.sp.: Colonel Sir David Bruce, C.B., F.R.S., and Captains A. Hamerton, H. R. Bateman and F. P. Mackie.—The Incidence of Cancer in Mice of Known Age: Drs. E. F. Bashford and J. A. Murray.—A Method of Investigating the Total Volume of Blood contained in the Living Body: Drs. J. O. Wakelin Barratt and W. Yorke.

ROYAL INSTITUTION, at 3.—Newfoundland: J. G. Millais.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Annual General Meeting.—Some Tests and Uses of Condensers: W. M. Mordey.

INSTITUTION OF MINING AND METALLURGY, at 8.—Notes on the Zangezour Copper Mines: A. L. Simon.—The Determination of Tungstic Acid in Low-grade Wolfram Ores: H. W. Hutchin and F. J. Tonks.—Cupellation Experiments: the Thermal Properties of Cupels: C. O. Bannister and W. N. Stanley.—The Bessemerising of Hardhead: Donald M. Levy and D. Ewen.—The Use of Standards in Reading Gold Pannings: Stephen J. Lett.—Notes on the Scaling and Sweating of Copper Battery Plates: Sydney F. Goddard.

FRIDAY, MAY 21.

ROYAL INSTITUTION, at 9.—Afforestation: Hon. Ivor C. Guest, M.P.

SATURDAY, MAY 22.

ROYAL INSTITUTION, at 3.—The Secret Societies of the Banks' Islands: Dr. W. H. R. Rivers, F.R.S.

MONDAY, MAY 24.

LINNEAN SOCIETY, at 3.—Anniversary Meeting.

ROYAL GEOGRAPHICAL SOCIETY, at 3.—Anniversary Meeting.

TUESDAY, MAY 25.

ROYAL INSTITUTION, at 3.—The Hittites: (2) Recent Discoveries in Asia Minor and Northern Syria: Prof. John Garstang.

ZOOLOGICAL SOCIETY, at 8.30.—Description of a New Species of the Genus Alpheus, Fabr., from the Bay of Batavia: Dr. J. G. De Man.—On the Skull of a Black Bear from Eastern Tibet, with a Note on the Formosan Bear: R. Lydekker.—The Anatomy of the Olfactory Organ of Teleostean Fishes: R. H. Burne.

WEDNESDAY, MAY 26.

GEOLOGICAL SOCIETY, at 8.—The Cauldron Subsidence of Glencoe, and the Associated Igneous Phenomena: C. T. Clough, H. B. Muff, and E. B. Bailey.—The Pitting of Flint Surfaces: C. Carus-Wilson.

ROYAL SOCIETY OF ARTS, at 8.—The Manufacture of Nitrates from the Atmosphere by the Electric Arc: S. Eyde.

BRITISH ASTRONOMICAL ASSOCIATION, at 5.—Chinese Astronomy: E. B. Knobel.

THURSDAY, MAY 27.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: Notes concerning Tidal Oscillations upon a Rotating Globe: Lord Rayleigh, O.M., F.R.S.—The Absolute Value of the Mechanical Equivalent of Heat in Terms of the International Electrical Units: Prof. H. T. Barnes.—An Approximate Determination of the Boiling Points of Metals: H. C. Greenwood.—Some Results in the Theory of Elimination: A. L. Dixon.—The Liquidus Curves of the Ternary System, Aluminium-Copper-Tin: J. H. Andrew and C. A. Edwards.

ROYAL INSTITUTION, at 3.—Newfoundland: J. G. Millais.

INSTITUTION OF MINING ENGINEERS, at 11.—Presidential address: Dr. R. T. Moore.—Electricity in Coal-mines: R. Nelson.—Comparison between the Value of Surplus Gas from Regenerator Bye-product Coke-ovens and Steam produced by the Waste Heat from Bye-product Coke-ovens, with Special Reference to the Evence Coppée new Bye-product Ovens: M. H. Mills.

FRIDAY, MAY 28.

ROYAL INSTITUTION, at 9.—Advances in our Knowledge of Silicon as an Organic Element: Dr. J. Emerson Reynolds, F.R.S.

INSTITUTION OF MINING ENGINEERS, at 10.30.—The Use of Concrete for Mine Support: Prof. W. R. Crane.—Mining in British Columbia: Mrs. Rosalind Young.

SATURDAY, MAY 29.

ROYAL INSTITUTION, at 3.—The Secret Societies of the Banks' Islands: Dr. W. H. R. Rivers, F.R.S.

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